CV PROF: STEFANO PANZIERI

Professor of Automatic Control at Department of Engineering of the University of ROMA TRE.

POSITIONS

- Full Professor, , Automatic Control, University ROMA TRE (since 2019)
- Associate Professor, Automatic Control, University ROMA TRE (since 2003)
- Assistant Professor, Automatic Control, University ROMA TRE (1996-2003)

ISTITUTIONAL ACTIVITIES

- Director of Master second level "La cybersecurity per la protezione dei sistemi di controllo nell'industria 4.0 e nelle infrastrutture critiche"
- Coordination of Ph.D. programme in Computer Science and Automation (2008-2020)
- Rector's delegate for Digital Technological Transfer (since 2018)
- Vicepresident of "Comitato Unico di Garazia" of ROMA TRE (2015-2019)
- I have been a member of the Working group on Critical Infrastructures of Prime Minister Council.
- I have been member of the Working group on Cyber Security National Strategies of Prime Minister Council.

LABORATORY AND Ph.D. Students

- I have contributed to the development of the Robotics Laboratory (since 2001)
- I am the director of MCIPlab, Models for Critical Infrastructure Protection laboratory (since 2012)
- I am the director of the Automation Laboratory for undergraduate and graduate students (since 2005)
- I have been the tutor of 12 Ph.D. students

TEACHING

- Industrial Automation Control Systems – SCADA (Bachelor course of Automation and Computer Science Engineering)
- Fundamentals of Automatic Control (Bachelor course of Mechanical Engineering)
- Automatic Control (Master degree in Mechanical Engineering)
- Distributed Control for Large Infrastructures (Master degree in Management and Automation Engineering)

MAIN AREAS OF RESEARCH

The mathematical frameworks and techniques that I have applied include: Iterative Learning Control, Nonlinear control, Fuzzy Logic, Bayesian Estimation, Kalman Filtering, Particle Filters, Non-holonomic systems, Dempster-Shafer Theory, Genetic Algorithms, Neural Networks, Complex Networks analysis, Distributed Estimation, MPC. In particular, in the following areas have been found many published results.

[Flexible Robots]
In the area of robots with elastic elements I have published several paper about control with nonlinear techniques, iterative learning control (ILC) and cyclic control, in particular showing the feasibility of ILC for such systems with instable

zero-dynamics. Some papers have been dedicated to the problem of repositioning showing the existence of iterative algorithms with low complexity. Many experiments have been conducted on the FLEXARM, a two link flexible arm that I have contributed to design and build.

[Mobile Robotics]

In this field I worked on many problems, ranging from iterative trajectory learning to path planning, from map building to localization problems also in multi-robot environments. Many results have been published using several different techniques. Some remarkable contributions are in the field of simultaneous localization and mapping. I have put some attention into the problem of navigation in structured and unstructured environments with a special interest for the problem of sensor based navigation and sensor fusion. Many techniques derived from Fuzzy Logic, Bayesian Estimation (Kalman Filtering) and Dempster-Shafer theory have been developed and applied to the problem of mapping building and vision based localisation.

[Sensor Networks]

In this area I have published several works on the problem of localization using innovative algorithms and extending some previous results. The techniques that have been used range from interlaced Kalman filtering to interagent particle filters, and some new results have been found using shadow edges.

[Complex Networks]

I have been interested in Complex Networks for modelling purposes and I have researched many application also to the path planning problem. An important result has bee found with the application of complex networks theory into evolutionary computation showing the particular performances of genetic algorism over structured spaces. Many applications have been found in the mobile robot localization problem.

[Smart Buildings, Smart Grids]

In this field I have studied energy problems and found many results regarding fault detection and anomaly detection. Some work has been done using Model Predictive Control applied with a distributed/decentralized philosophy to the temperature control problem for a set of communicating rooms.

[Critical Infrastructures Protections]

I have been among the fist to work in this sector involving modelling and control problems. I have published several papers on main conferences and Journals in the field and I have contributed to the developing of a simulation model, the CISIApro approach, able to evaluate cascading effects in a network of infrastructures.

PUBBLICATIONS

I have co-authored 44 journal papers, and co-authored more than 110 international conference papers.

BIBLIOMETRIC IMPACT
- Scopus:
126 documents
982 citations

19 h-index

- Google Scholar:
188 documents
1868 citations
23 h-index

MAIN PROJECTS RESPONSABILITIES

- PROJECT COORDINATION

(2015) **SMART ENVIRONMENTS** – Valorizzazione della ricerca e crescita del territorio negli ambienti intelligenti. Finanziato dalla Regione Lazio - AVVISO PUBBLICO RELATIVO A PROGETTI DI RICERCA PRESENTATI DA UNIVERSITÀ E CENTRI DI RICERCA – LR 13/2008

(2014) **URANIUM** – Unified Risk Assessment Negotiation via Interoperability Using Multi-sensor data European Commission – DGJFS Prevention Preparedness and Consequence Management of Terrorism and other Security related Risks CIPS Grant Action 2013.
This project was about the developing of different approaches in the field of CIP for Decision Support: 1) A Unit Commitment problem in presence of risk associated to energy sources; 2) an optimal resources allocation in the emergency operation sector; 3) a Game Theory approach to devise optimal strategies.

- SCIENTIFIC COORDINATION OF INTERNATIONAL PROJECTS:

(2017) **ATENA**- Advanced tools to assess and mitigate the criticality of ICT components and their dependencies over Critical Infrastructures - Horizon 2020 – Secure Societies – DS-3-2015 – The role of ICT in Critical Infrastructures Protection. The project proposes an innovative and modernized logical framework with design improvements of role, operation, architecture, and security components for IACSs, exploiting also Software Defined Networking and Software Defined Security paradigms, and recommends equipment and algorithms devoted to patch already existing IACSs without the disruption of current services.

(2012) **CockpitCI** - Cybersecurity on SCADA: risk prediction, analysis and reaction tools for Critical Infrastructure. FP7-SEC-2011.2.5-1 Cyber attacks against critical infrastructures – Capability Project
This project was about the evaluation of the effects of cyber attacks over RTU controlling the Electrical Infrastructure. Some new smart
devices have been also developed for the protection of PLC based RTUs.

(2008) **MICIE** - Tool for systemic risk analysis and secure mediation of data exchanged across linked CI information infrastructures.
FP7-ICT-SEC-2007.1.7 In this project some new algorithms for evaluating cascading effects have been developed and a new framework

for modelling systems at different levels of abstraction has been designed. The effort of the whole project was in designing a decision

support system for the electric operator.

- LOCAL COORDINATOR INTERNATIONAL PROJECTS:

(2012) **FACIES** - online identification of Failure and Attack on interdependent Critical Infrastructures.
Prevention Preparedness and Consequence Management of Terrorism and other Security related Risks CIPS Grant Action 2011

(2008) **SECURSPACE** - Prevention Preparedness and Consequence Management of Terrorism and other Security related Risks.
Analysis of the use of satellite technologies in the overall economy structure and in Emergency Operations. Risk assessment of the disruption of Communication and Navigation satellite functionalities for the various economy sectors. Risk assessment of the disruption of Communication and Navigation satellite functionalities for the Emergency Operations.

- LOCAL COORDINATOR NATIONAL PROJECTS:

(2013) Sviluppo di Algoritmi per la gestione ottimale di edifici su un caso pilota
MSE - Ministero Sviluppo Economico

(2012) Realizzazione di una piattaforma integrata per il data fusion di segnali provenienti da sistemi sensoriali per applicazioni di smart city
integrate nella rete della pubblica illuminazione.
MSE - Ministero Sviluppo Economico

(2011) Realizzazione di una piattaforma integrata per il data fusion di segnali provenienti da sistemi sensoriali per applicazioni di smart city
integrate nella rete della pubblica illuminazione
MSE - Ministero Sviluppo Economico

(2010) Studio di fattibilità e progettazione di un sistema di ottimizzazione del flusso luminoso della illuminazione pubblica
MSE - Ministero Sviluppo Economico

(2008) Sviluppo di metodi di controllo per il sistema edificio-impianto
MSE - Ministero Sviluppo Economico

- INNOVATION MANAGER INTERNATIONAL PROJECTS:

(2019) **RESISTO** - RESILience enhancement and risk control platform for communication infraSTructure Operators. European Commission.
Horizon 2020 – Secure Societies – DS-3-2015 – The role of ICT in Critical Infrastructures Protection

- JOURNAL PAPERS

Network Structural Vulnerability: A Multiobjective Attacker Perspective

Faramondi, L., Oliva, G., Panzieri, S., (...), Munetomo, M., Setola, R.

(2019) IEEE Transactions on Systems, Man, and Cybernetics: Systems

Gossip algorithm for multi-agent systems via random walk

Oliva, G., Panzieri, S., Setola, R., Gasparri, A.

(2019) Systems and Control Letters

From detecting cyber-attacks to mitigating risk within a hybrid environment

Panzieri, S., Foglietta, C., Masucci, D., Palazzo, C., (...), Cruz, T., Lev, L.

(2019) IEEE Systems Journal

Smart Behavioural Filter for Industrial Internet of Things: A Security Extension for PLC

Corbò, G., Foglietta, C., Palazzo, C., Panzieri, S.

(2018) Mobile Networks and Applications

Integrated protection of industrial control systems from cyber-attacks: the ATENA approach

Panzieri, S, Adamsky, F., Aubigny, M., Battisti, F., (...), Rosa, L., Soua, R.

(2018) International Journal of Critical Infrastructure Protection

21, pp. 72-82

Finding critical nodes in infrastructure networks Faramondi, L., Setola, R., Panzieri, S., Pascucci, F., Oliva, G.

(2018) International Journal of Critical Infrastructure Protection

20, pp. 3-15

Miciolino, E.E., Setola, R., Bernieri, G., Panzieri, S., Pascucci, F., Polycarpou, M.M.

Fault diagnosis and network anomaly detection in water infrastructures

(2017) IEEE Design and Test, 34 (4), art. no. 7878551, pp. 44-51.

Oliva, G., Setola, R., Panzieri, S.

Critical clusters in interdependent economic sectors: A data-driven spectral clustering analysis

(2016) European Physical Journal: Special Topics, 225 (10), pp. 1929-1944.

Oliva, G., Setola, R., Panzieri, S., Pascucci, F.

Localization of networks with presence and distance constraints based on 1-hop and 2-hop mass–spring optimization

(2016) ICT Express, 2 (1), pp. 19-22.

Oliva, G., Panzieri, S., Pascucci, F., Setola, R.

Sensor networks localization: Extending Trilateration via shadow edges

(2015) IEEE Transactions on Automatic Control, 60 (10), art. no. 7045608, pp. 2752-2755.

Moretti, F., Pizzuti, S., Panzieri, S., Annunziato, M.

Urban traffic flow forecasting through statistical and neural network bagging ensemble hybrid modeling

(2015) Neurocomputing, 167, pp. 3-7.

Foglietta, C., Panzieri, S., Pascucci, F.
Algorithms and tools for risk/impact evaluation in critical infrastructures
(2015) Studies in Computational Intelligence, 565, pp. 227-238.

Carli, M., Panzieri, S., Pascucci, F.
A joint routing and localization algorithm for emergency scenario
(2014) Ad Hoc Networks, 13 (PART A), pp. 19-33.

Oliva, G., Panzieri, S., Setola, R.
An amendment to Distributed synchronization under uncertainty: A fuzzy approach
(2014) Fuzzy Sets and Systems, 235, pp. 104-106.

Di Pietro, A., Panzieri, S.
Taxonomy of SCADA systems security testbeds
(2014) International Journal of Critical Infrastructures, 10 (3-4), pp. 288-306.

Oliva, G., Panzieri, S., Setola, R.
Discrete-time linear systems with fuzzy dynamics
(2014) Journal of Intelligent and Fuzzy Systems, 27 (3), pp. 1129-1141.

Oliva, G., Panzieri, S., Priolo, A., Ulivi, G.
Characterising failures and attacks in average Consensus
(2014) International Journal of Systems, Control and Communications, 6 (1), pp. 1-19.

Santini, R., Foglietta, C., Panzieri, S.
Evidence theory for cyber-physical systems
(2014) IFIP Advances in Information and Communication Technology, 441, pp. 95-109.

Digioia, G., Panzieri, S.
Homeland situation awareness through mining and fusing heterogeneous information from intelligence databases and field sensors
(2013) International Journal of System of Systems Engineering, 4 (3-4), pp. 190-210.

Foglietta, C., Panzieri, S., Macone, D., Liberati, F., Simeoni, A.
Detection and impact of cyber attacks in a critical infrastructures scenario: The CockpitCI approach
(2013) International Journal of System of Systems Engineering, 4 (3-4), pp. 211-221.

Oliva, G., Panzieri, S., Setola, R.
Distributed consensus under ambiguous information
(2013) International Journal of System of Systems Engineering, 4 (1), pp. 55-78.

Digioia, G., Foglietta, C., Oliva, G., Panzieri, S.
Aware online interdependency modelling via evidence theory
(2013) International Journal of Critical Infrastructures, 9 (1-2), pp. 74-92.

Panzieri, S., Pascucci, F., Sciavicco, L., Setola, R.
Distributed cooperative localization
(2013) Journal of Information Technology Research, 6 (3), pp. 49-67.

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Homeland situation awareness through mining and fusing heterogeneous information from intelligence databases and field sensors
(2012) Proceedings of SPIE - The International Society for Optical Engineering, 8407, art. no. 84070T, .

Oliva, G., Panzieri, S., Setola, R.
Distributed synchronization under uncertainty: A fuzzy approach
(2012) Fuzzy Sets and Systems, 206, pp. 103-120.

Gasparri, A., Fiorini, F., Di Rocco, M., Panzieri, S.
A networked transferable belief model approach for distributed data aggregation
(2012) IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics, 42 (2), art. no. 6056577, pp. 391-405.

Oliva, G., Panzieri, S., Setola, R.
Fuzzy dynamic input-output inoperability model
(2011) International Journal of Critical Infrastructure Protection, 4 (3-4), pp. 165-175.

Gasparri, A., Panzieri, S., Priolo, A.
A fitness-sharing based genetic algorithm for collaborative multi-robot localization
(2010) Intelligent Service Robotics, 3 (3), pp. 137-149.

Oliva, G., Panzieri, S., Setola, R.
Agent-based input-output interdependency model
(2010) International Journal of Critical Infrastructure Protection, 3 (2), pp. 76-82.

Gasparri, A., Panzieri, S., Pascucci, F., Ulivi, G.
An Interlaced Extended Kalman Filter for sensor networks localisation
(2009) International Journal of Sensor Networks, 5 (3), pp. 164-172.

De Porcellinis, S., Panzieri, S., Setola, R.
Modelling critical infrastructure via a mixed holistic reductionistic approach
(2009) International Journal of Critical Infrastructures, 5 (1-2), pp. 86-99.

Gasparri, A., Panzieri, S., Pascucci, F.

A spatially structured genetic algorithm for multi-robot localization
(2009) Intelligent Service Robotics, 2 (1), pp. 31-40.

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Simultaneous localisation and mapping of a mobile robot via interlaced extended Kalman filter
(2008) International Journal of Modelling, Identification and Control, 4 (1), pp. 68-78.

Panzieri, S., Setola, R.
Failures propagation in critical interdependent infrastructures
(2008) International Journal of Modelling, Identification and Control, 3 (1), pp. 69-78.

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Simulation of heterogeneous and interdependent critical infrastructures
(2008) International Journal of Critical Infrastructures, 4 (1-2), pp. 110-128.

Gasparri, A., Panzieri, S., Pascucci, F., Ulivi, G.
Monte carlo filter in mobile robotics localization: A clustered evolutionary point of view
(2006) Journal of Intelligent and Robotic Systems: Theory and Applications, 47 (2), pp. 155-174.

Panzieri, S., Pascucci, F., Ulivi, G.
An outdoor navigation system using GPS and inertial platform
(2002) IEEE/ASME Transactions on Mechatronics, 7 (2), pp. 134-142.

Oriolo, G., Panzieri, S., Ulivi, G.
Learning optimal trajectories for non-holonomic systems
(2000) International Journal of Control, 73 (10), pp. 980-991.

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Cyclic control of linear systems with application to a flexible arm
(1998) IEE Proceedings: Control Theory and Applications, 145 (1), pp. 19-24.

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Application of cyclic control to a two-link flexible arm
(1998) Automatica, 34 (8), pp. 1025-1029.

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(1998) International Journal of Robotics Research, 17 (9), pp. 954-970.

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(1997) Kybernetika, 33 (1), pp. 87-102.

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(1997) Automatica, 33 (11), pp. 2065-2069.

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Repositioning control of a two-link flexible arm by learning
(1997) Automatica, 33 (4), pp. 579-590.

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End-effector regulation of robots with elastic elements by an iterative scheme
(1996) International Journal of Adaptive Control and Signal Processing, 10 (4-5), pp. 379-393.

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An iterative scheme for learning gravity compensation in flexible robot arms
(1994) Automatica, 30 (6), pp. 993-1002.

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Learning gravity compensation in robots: Rigid arms, elastic joints, flexible links
(1993) International Journal of Adaptive Control and Signal Processing, 7 (5), pp. 417-433.